Green 4 Industry Tech Book

Focus on Sustainability and Intelligent Digital Transformation.

Boosting technology transfer for a sustainable industry.

About

Green4Industry project aims to promote and boost the transfer of scientific and technological knowledge to the national industrial ecosystem in areas of Nanotechnology, Advanced Materials and Smart Systems, enabling a Sustainable and Intelligent Digital transformation of Industry, as established by European Green Deal targets. A set of initiatives and actions of demonstration, dissemination and valorisation of Research & Development results and their economic exploitation by companies, were outlined to stimulate demand by traditional industries for technological solutions leveraging added-value and strengthening competitiveness.

The Project is developed by CeNTI - Centre for Nanotechnology and Smart Materials, a Technology and Innovation Centre (CTI), private, non-profit, with multisectoral orientation that provides applied R&D for industrial endogenization of new disruptive technologies, product engineering and upscale for companies via a B2B approach.

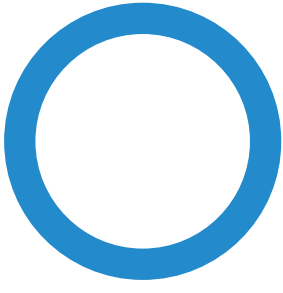
Target areas:

- Energy
- Transport
- Industry
- Research & Innovation

“Improve the well-being and health of citizens and future generations.”

The European Green Deal Actions aims to provide, among other benefits, “renovated, energy efficient buildings, cleaner energy and cutting-edge clean technological innovation, longer lasting products that can be repaired, recycled and re-used, and a globally competitive and resilient industry”.

Transport



It plays an essential role in society by ensuring the mobility of people and goods.

Action

Transport system has been undergoing constant evolution as a result of technological innovation throughout the entire value chain and the demand for solutions that make them more efficient, safe and environmentally friendly. Nevertheless, transport of people and goods continues to have a major negative impact on the environment, representing around 25% of EU's total greenhouse gas emissions. In this context, efforts have been made to develop mobility solutions that can change the paradigm of this sector, and make European continent forerunner in climate neutrality associated to transport sector.

Technology

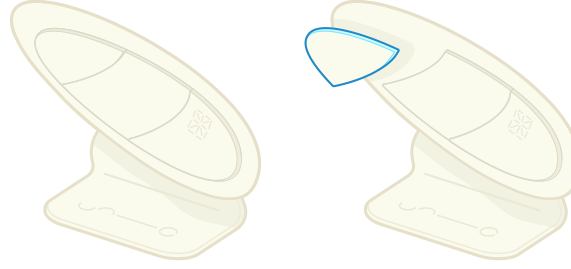
Novel solutions are based in the development of more efficient energy management systems and the use of more sustainable and intelligent materials, to mitigate the negative impacts on the environment and promote the transition to a more sustainable, intelligent and resilient sector, complemented with Smart Cities solutions.

Demonstrator

Alternative materials with less environmental impact, than those traditionally used, are exemplified in the demonstrator. The new material solutions should be of natural origin, fulfilling some properties of commonly used fossil-based materials, such as durability, resistance, and low production cost.

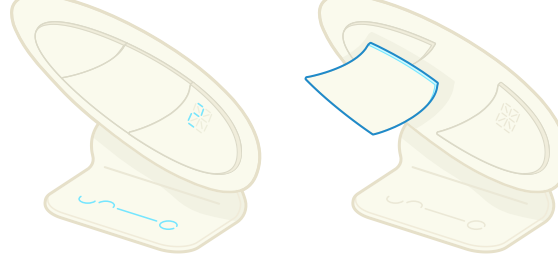
Materials

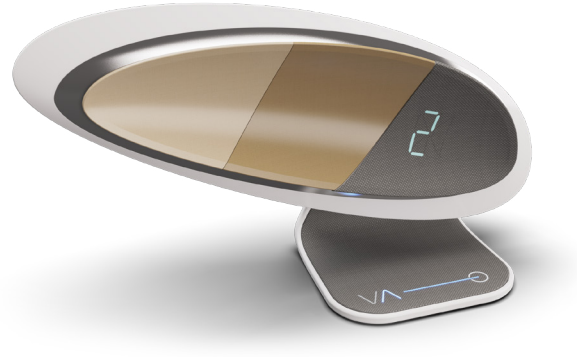
A bio-based composite material was developed, having the surface functionalised through application of different coatings, using recycled based materials, which will confer numerous properties, such as anti-scratch or anti-fingerprint. The versatility of applications of these materials can be enhanced with the applied functionalities



Structure

The structure includes three detachable panels, containing different samples: base composite; composite with functional coating; and composite coated with recycled fabric, which will integrate an alphanumeric luminescent display, where it will be possible to change the displayed value through a control panel with capacitive sensors.

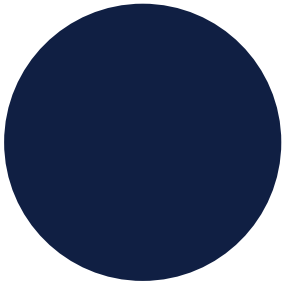




Applications

The application of composite materials can be quite versatile and wide, as they combine properties of different types of materials, which thus enables the obtention of materials with different mechanical and aesthetic characteristics. Examples of these applications can be automotive interior parts, whether with more aesthetic or structural functions, decorative panels for aircraft interiors and rail transport or even nautical.

Industry



It has been particularly impacted by technology evolution.

Action

The Industry has been driven towards continuous improvement of production processes, making them more efficient, increasing productivity, and ensuring product uniformity, whilst guaranteeing industrial workers safety, by mitigating or even suppressing potential risks that they are usually exposed. On the other hand, it is also a concern in technological development to guarantee the safety of industrial workers, so that potential risks to which they are usually exposed are reduced, or in some cases completely suppressed.

Technology

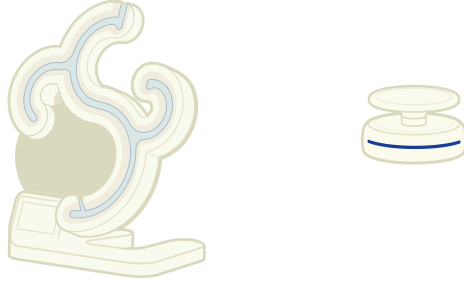
Amongst others, user-focused solutions have been developed, aiming to ensure workers safety and well-being when carrying out inherent functions to their work activity, thus promoting their productivity. The monitoring of workers biometric parameters and location, as well as environmental conditions to which they are exposed, are some of the technologies.

Demonstrator

Integration of smart systems in the demonstrator highlights the advantages of its use in logistics processes.
Monitoring and tracking of products, through use of printed temperature and impact/shock sensors and NFC tags, that can be integrated in different materials and dimensions, allow companies and their customers to ensure the conditions during transport and storage.

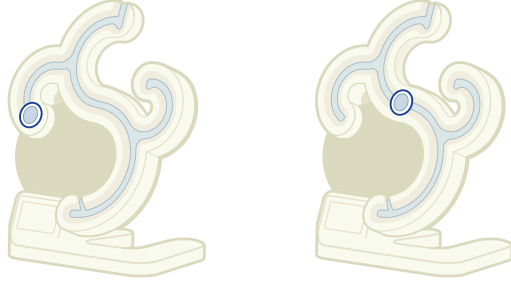
Materials

Each part will integrate a temperature sensor, an impact/shock sensor and an NFC Tag, while the circuit will have five NFC readers and a heating band.



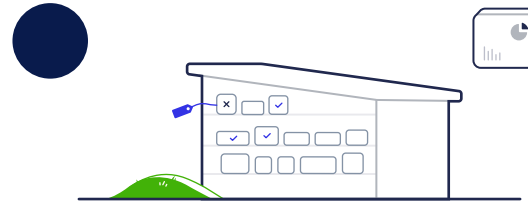
Structure

Packages are represented by pieces/items that can move in defined circuits, which contains an impact/shock zone and a heating zone, simulating their movement during transport. At the end of the circuit, detailed information, including the route, the subject conditions, and the status of the “merchandise”, can be accessed on the integrated display.



Industry Applications

The use of printed sensors allows their integration in different materials and dimensions, which is advantageous for a wide variety of applications, namely in the industry field. This technology allows any product, regardless of its size or material, to be easily monitored and remotely, through sensor integration. Being associated with the use of NFC tags, it also allows the location of products and facilitates the companies' organization in terms of logistics, improving their monitoring and control.



Energy

It is one of the main topics to combat climate change and environmental degradation.

Action

The Energy system decarbonisation is crucial to reach EU's 2030 climate goals and subsequent long-term strategy of carbon neutrality by 2050. Renewable energy sources are alternatives to fossil fuels, contributing to greenhouse gas emissions reduction, diversification of energy supply and dependency reduction on unreliable and volatile fossil fuel markets. The energy generation capacity and efficiency of current solutions can be improved, in order to not only reduce CO_2 emissions, but also create jobs and save money by reducing the dependence on energy imports.

Technology

Efforts have been made to find solutions, strategies, and/or systems capable of promoting energy generation, and intelligent systems for its storage, boosting the demand for sustainable management alternatives of energy consumption. The recovery, recycling and reuse of lithium-ion batteries are an example.

Energy

Semi-transparent photovoltaic panels seamlessly integrated into a modular construction will be able to capture the energy, being indicated on the integrated display, which can be later used to charge a reused car battery, for instance, extending its useful life.

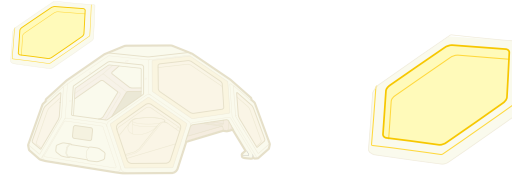
To reduce the need for maintenance and the light capture interference, the demonstrator surface have an anti-dust and water-repellent coating.

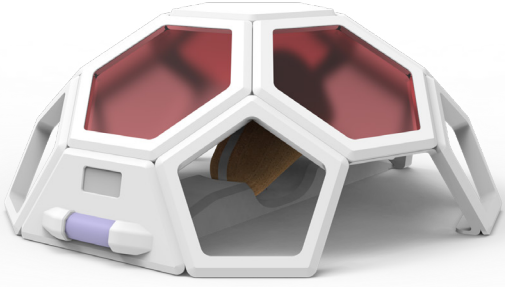
Materials

5 semi-transparent photovoltaic panels are integrated into a geometric modular structure, which also incorporates a luminophore pigment into the polymeric base, allowing the light conduction, improving and increasing the capture by the panels. To improve surface properties, sucha as repellency, functional coatings were applied.

Structure

The demonstrator consists of a geometric structure of half truncated icosahedron, representing a possible urban structure. The hexagonal faces with solar panels integrated in the edges are modular and can be removed and handled. Its placement can be done in any direction, reducing the possibility of errors.





Applications

The possibility of seamlessly integrating photovoltaic panels enables the creation of non-disruptive architectural structures, integrated into natural environments without causing discomfort. Through the pieces' modularity, a wide variety of shapes that can be built to suit the environments where they are inserted, can be obtained. The functional coating will reduce interference and maintenance needs, making the product a more sustainable solution.

Research & Innovation

It plays a central role in the new economic paradigm.

R&I

CeNTI, as a multi-technological and multisectoral Technology and Innovation Centre (CTI), is focused on the development of new technological solutions for a circular economy and new mobility paradigms, the sustainability of material resources and new processes with less environment impact, in the creation of new interactive technologies that promote the digital transformation of processes and/or products for industry, on the development of new eco-sustainable industrial processes, and in new materials of biological origin that enable the paradigm shift in industries, such as textiles and plastics, by exploring solutions that are 100% recyclable, transformable into new products, or 100% biodegradable.

Competences

CeNTI's innovation portfolio encompasses several projects that demonstrate its commitment and mission to support and promote various industry sectors, playing a fundamental role in the transfer and valorisation of technologies and competences for the business ecosystem, which intends to integrate innovative solutions leveraged by Nanotechnology, Advanced Materials and Smart Systems. The creation of new processes and/or processes with high added value and the integration of new technologies into traditional markets will help consolidate the businesses position in global markets.

Technology Offers

Intellectual property (IP) is a strategic tool in fostering innovation and rewarding creativity.

Complete Tech Offers at:

CeNTI as a key technology enabler for a wide range of industrial sectors, provides innovation leveraged by Nanotechnology, Advanced Materials and Smart Systems, leading to the development of innovative value-added solutions that boost the competitiveness and position of national industries in the global market. CeNTI has a large IP portfolio and seeks licensing and/or research partnerships.

Here you will find a selection of available opportunities.

Tech Offer Non-fluorinated water-repellent formulation for dry cleaning.

Totally fluorine free hydrophobic formulation for water repellent finish to be used in dry cleaning processes.

Market Application	Dry-cleaning processes.
TRL	4
Technology Description	The technology developed is based on the use of a new cellulose derivative (Long-chain Cellulose Ester) as a totally eco-friendly non-fluorinated hydrophobic additive for dry-cleaning water repellency finishes in any type of textile composition. This new additive/formulation can be applied for repellent/water proofing finish on clothes by the simple and conventional dry-cleaning process. Additionally, there is no need to use of crosslinkers to anchor the additive to textiles, nor pre-treatments.

Tech Offer Vehicle seat cover with a monitoring system.

Smart seat cover that includes a vital signs sensors network for monitoring the physiological state.

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Market Application

Automotive industry, Aeronautical industry, Baby car seat.

TRL

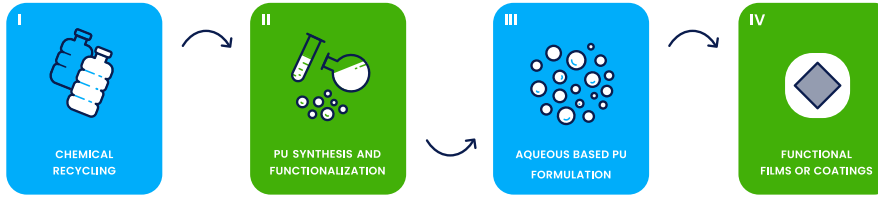
4

Technology Description

This invention presents a novel approach to monitor the comfort and physiological state of the driver while driving, to reduce the risk of accidents caused by fatigue, sleepiness and others. This was possible through the development of a smart seat cover, compatible with the fabrication processes of textiles that can then be used in car seats.This system encompasses a fully embedded textile sensor network, which includes a bio-radar system (for breathing monitoring) and additional comfort sensors, such as temperature, humidity and pressure sensors.

Tech Offer Biodegradable and self-healing waste derived polyurethane.

An innovative, functional and ecological polyurethane with intrinsic biodegradable and self-healing properties, reduced carbon foot-print and increased durability.



Market Application	Automotive, Packaging, Textile, Industries using PU-based finishing formulations.
TRL	4
Technology Description	This invention relates to a tuneable Polyethylene Terephthalate (PET) waste derived PU with biodegradability and self-healing properties achieved during the synthesis process. The new synthetised PU, made from PET wastes via chemical recycling, presents thermal stability up to 215 °C, self-healing properties when heated at 60 °C - 70 °C, potential for biodegradation and good chemical resistance to saline medium acid, alkaline and water solution. The developed innovative, functional and ecological PU can be used for the preparation of functional films and coatings for multiple applications.

Contacts

Contacts

CeNTI
centi@centi.pt
+351 252 104 152

CeNTI - IP Office
ipoffice@centi.pt

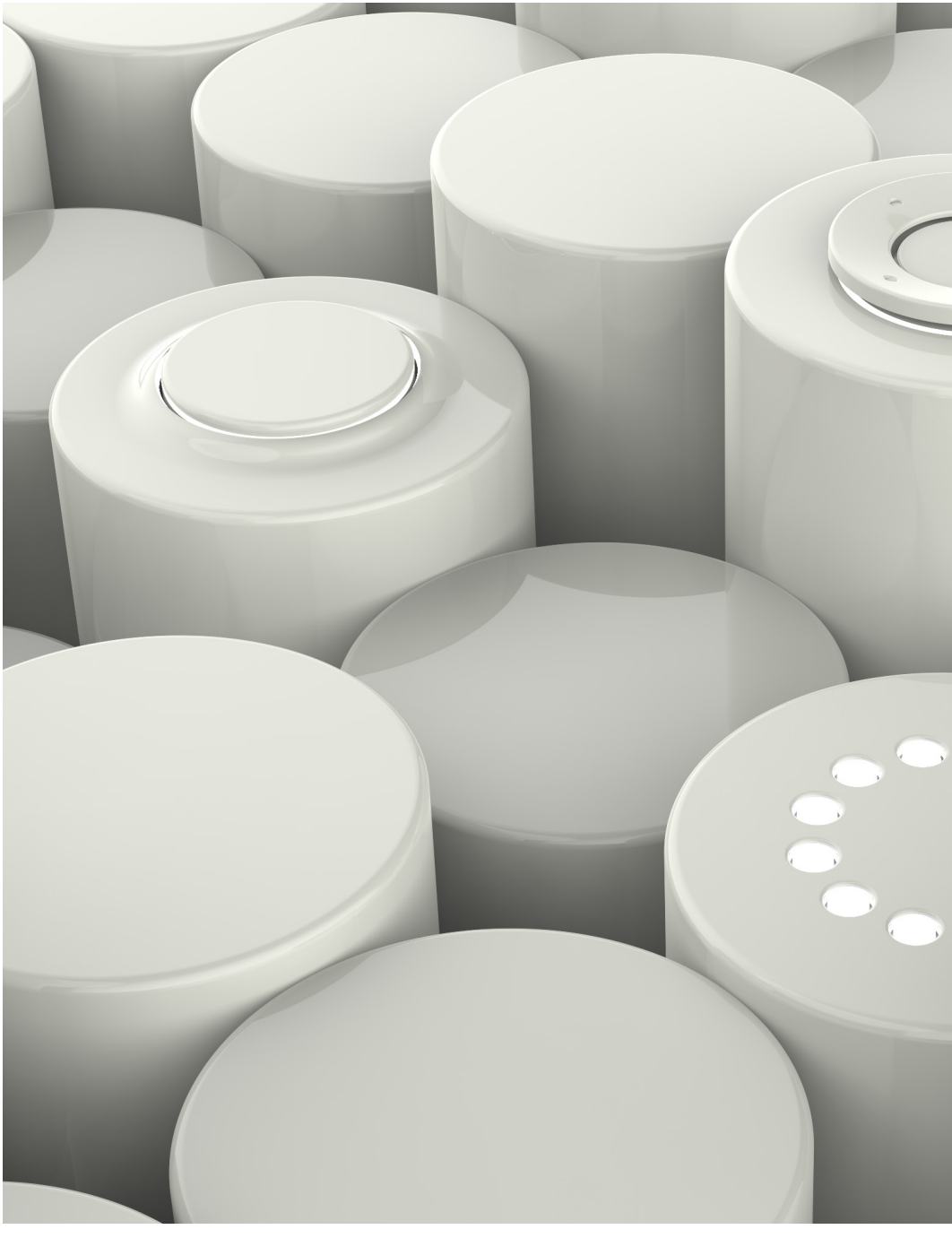
More info at

CeNTI

Green for Industry

European Green Deal

It will be essential to mobilize the research and foster disruptive innovation to achieve the European Green Deal's goals.

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